

# NASA TECH BRIEF

## *Lewis Research Center*



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### Watertight Low-Cost Electrical Connector

#### The problem:

Devise a small, inexpensive, waterproof electrical connector assembly for use with Teflon\*-jacketed cables that will withstand the following environment:

1. pressure from  $1.8 \times 10^3 \text{ N/m}^2$  (0.25 psia) vacuum to atmospheric;
2. temperature from 280 K (50° F) to 450 K (350° F);
3. exposure to saturated steam 450 K; and
4. the effects of saturated steam suddenly introduced into the vacuum.

Commercially-available waterproof connectors will keep out rain and other "undriven" contaminants, but will not seal under the specified conditions. Available watertight connectors are expensive and quite large in size. Readily-available potting-materials will not endure

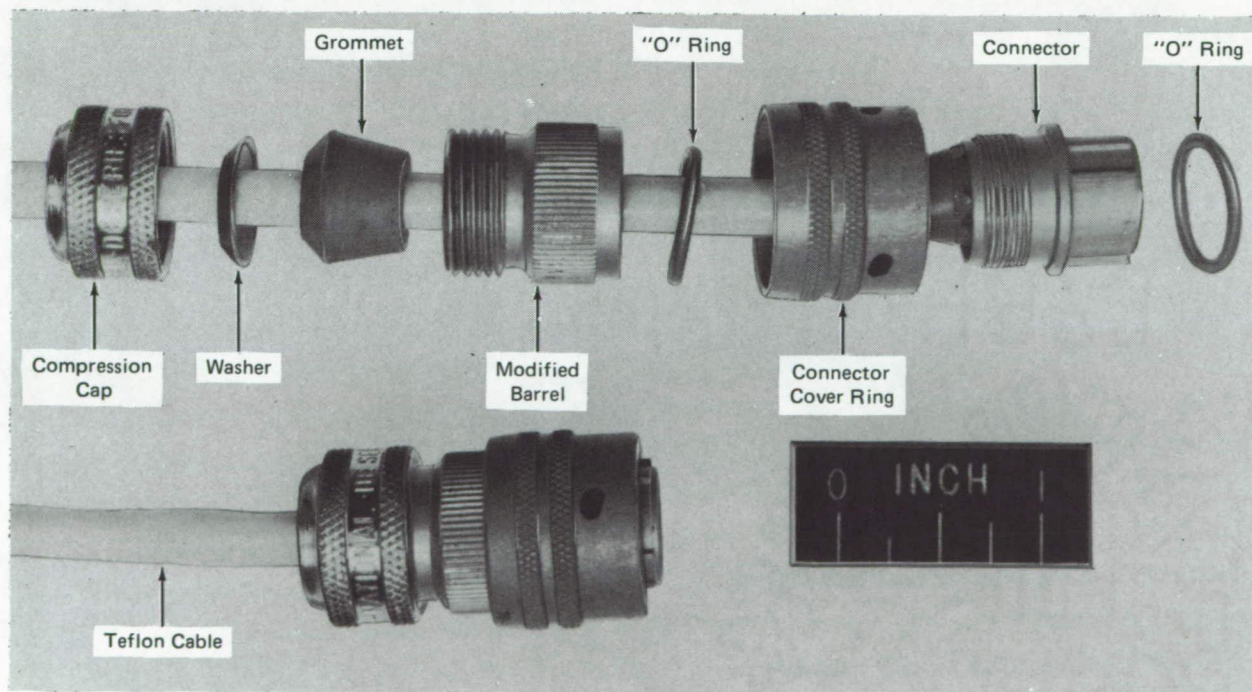
throughout the 280 K to 450 K temperature range because their thermal expansion characteristics are not compatible with those of the Teflon\* cable. The potting material seal is further degraded by the pressure cycle with water vapor being forced into the fitting.

#### The solution:

Modify and combine component parts from different standard electrical connectors.

#### How it's done:

Three areas of the connector assembly must be made watertight: the cable entry, the threaded joint between the barrel and the connector cover ring, and the connector interface.



Hybrid Electrical Connector

(continued overleaf)

These three areas are sealed in the following manner:

1. To the cable entry, a standard cable sealing grip is welded to a standard connector barrel. This unit, with its threaded cap, metal washer, and grommet seal, provides a tight seal around the cable. This seal also has an advantage over other methods in that it maintains a uniform grip around the cable that does not deform the cable.
2. To the threaded joint between the barrel and the connector cover ring, an "O" ring is installed in the molded lip and groove provided by the standard parts.
3. To the connector interface, an "O" ring is placed between the mating connectors.

*\*DuPont's registered trademark.*

**Notes:**

1. All of the parts for these hybrid connectors are readily available from commercial sources.

2. For quantity production, the male portion of the cable sealing grip and the connector barrel are machined in one piece.

3. No additional documentation is available. Specific questions, however, may be directed to:

Technology Utilization Officer

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**Patent status:**

NASA has decided not to apply for a patent.

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